

have to infer from them the character of the physical realities which are their stimuli, must be erroneous. Prof. Stout's criticism appears to show that Prof. Alexander's doctrine cannot be sustained as it stands, but the fact that it can be put forward by a writer of such philosophical eminence is an interesting sign of the influence which Avenarius is at last beginning to exercise on British philosophy.

Very similar tendencies are revealed by Mr. A. Wolf's interesting paper on "Natural Realism and Present Tendencies in Philosophy." The interest awakened by Bergson's striking book "L'Évolution Créatrice" is witnessed to by Mr. Carr's disquisition on Bergson's theory of knowledge, and Mr. G. T. R. Ross's treatment of the satisfaction of thinking. Pragmatism, as one would expect, does not go unrepresented. Dr. Schiller inflicts one of those castigations which are becoming periodical with him on rationalism in a paper on "The Rationalistic Conception of Truth," and the subject also figures prominently in a so-called symposium on pluralism, in which different points of view are represented by Dr. Schiller, Prof. Muirhead, and the writer of this notice. The volume further contains an essay on "The Mutual Symbolism of Intelligence and Activity," by Mr. Foston, and a discussion between Prof. Bosanquet, Dr. Sophie Bryant and Mr. G. T. R. Ross on "The Place of Experts in Democracy."

A. E. TAYLOR.

*An Introduction to the Study of Biology.* By J. W. Kirkaldy and I. M. Drummond. Pp. iv+259. (Oxford: Clarendon Press, 1909.) Price 6s. 6d.

THIS little book represents an attempt to deal, within the limits of some 250 pages, with the study of biology as exemplified primarily by the organisms prescribed in the syllabus of the Oxford and Cambridge Schools' Examination Board. The authors have, however, realised the deficiencies of the type system and endeavoured to "bridge over the gulfs" by brief accounts of, or references to, a considerable number of forms "allied" to the selected types. Thus Monocystis, Hæmamœba, Bacillus, Chromulina, Actinosphaerium, Globigerina, Rhaphidococcus, Arcella, Euglena, Noctiluca, Stylochilia, Acineta, Desmids and Diatoms are all introduced as allies of the more familiar Protozoa, viz. Amoeba, Saccharomyces, Sphaerella, Vorticella and Paramoecium.

There is no doubt that a too rigid adherence to the type-system does produce a very disconnected idea of the animal kingdom, but we fear that the ordinary schoolboy will think that it is bad enough to have to make the acquaintance of the types without having to shake hands with so many of their relations. No fewer than sixteen types of animals and plants are dealt with in more or less detail, ranging from the Amoeba to the dogfish, and from the yeast to the sunflower, besides chapters on the distinction between animals and plants, the life-history of the frog, and the physiology of the rabbit.

The book contains numerous illustrations, for the most part borrowed from very familiar sources; a few are original, but we cannot congratulate the authors very warmly upon these. The picture of a crayfish on p. 112 is extraordinarily crude. The book gives an enormous amount of information gathered from a very wide field, but it is far too concentrated to be inspiring, and the authors do not appear to have succeeded in putting the general principles dealt with in a very clear light. We hope it is intended to be read in connection with a course of practical work, but we have not been able to find any reference to the necessity for such a course.

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#### LETTERS TO THE EDITOR.

[The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts intended for this or any other part of NATURE. No notice is taken of anonymous communications.]

#### The End of the Beagle.

It is well known that Charles Darwin began to advocate his famous doctrine of evolution after his voyage on board H.M.S. *Beagle* as naturalist, in the course of which he went to South America, Africa, and Oceania, and founded the theory of natural selection; but it has been a matter of regret among men of science throughout the world that the famous old ship had passed out of sight. As the result of careful inquiries, however, by Mr. Shigetaka Shiga, a renowned geographer in Japan, it has now been ascertained what was the ultimate fate of the *Beagle*.

Mr. S. Shiga has told the story to the editor of the *Yorodzu Chōhō*, the most popular newspaper in Tokyo, as follows:—"While I was attending the Sapporo Agricultural School some twenty years ago, I read in the *Living Age*, an American literary magazine, that the *Beagle* had been sold in Japan. After my inquiry it was found out that the warship had been bought by the Lord Shimadzu, who had changed its name to *Kenkō-maru*. Afterwards it was purchased by the Naval Department, and kept as a training ship of the Naval School in Tsukiji, Tokyo; but I had then no intention of preserving the famous ship, and so took no notice of the matter.

"This spring I heard Englishmen were sorry at having lost all trace of the *Beagle* at the hundredth anniversary of the great naturalist's birth. I then applied to a steward of Prince Shimadzu, as well as Viscount Captain Ogasawara, to get fuller particulars of the ship. According to the record of the Prince, the *Kenkō-maru* was certainly the *Beagle* that had been built of teak at Liverpool; it was bought for 75,000 dollars in Nagasaki on July 23 in the first year of Gwanji (1864 A.D.). Viscount Ogasawara informed me of the same fact, and added that the Naval Department ordered several officials, Kawamura (the late Count Sumiyoshi), Masuda, and Satō, to receive the same ship from the Shimadzu clan at Shinagawa on June 13 in the third year of Meiji (1870). It was in existence as a training-ship in the thirteenth year (1880), and was re-named *Yeiji-maru* at Yokosuga in the fifteenth year (1882). It was in May of the twenty-second year that the ship was sold by auction for 3276 yen to the late Kikusaburo Oaki, the proprietor of the Oaki Ship-building Yard.

"After some inquiries about the *Yeiji-maru* at Oaki's, I learned that the ship had been broken up at the old Shinagawa Fort, and that her cabin had been preserved for three years, when it was lost sight of; but Mr. Keizo Oaki, the present owner, who superintended the breaking up of the ship as the engineer-in-chief, has had the kindness to make inquiry of the workmen engaged in the work. The result is as follows. A part of the ship was at length discovered. It was being used as a stand for stones which have been piled up near the temple of Sutengū, in the premises of the dockyard. Having been taken out, it was found to be a part of the ribs of the *Beagle*, 3.5 feet in length, 1.5 feet in breadth, and of teak. Thus a portion of the fragments of the famous *Beagle* has at last been found."

TOYOZI NODA.

ICHINOSEKI, IWATE, JAPAN, OCTOBER 27.

#### The Maintenance of Forced Oscillations of a New Type.

In a paper "On a Class of Forced Oscillations" published in the *Quarterly Journal of Pure and Applied Mathematics* (No. 148, June, 1906), Mr. Andrew Stephenson discussed mathematically a proposition which may be stated in his own words thus: periodic non-generating force acting on a system in oscillation about a position of stable equilibrium exerts a cumulative action in intensifying or diminishing the amplitude, if its frequency is contained

within any one of a number of ranges lying in the vicinity of  $2\mu$ ,  $2\mu/2$ ,  $2\mu/3$  . . . , where  $\mu$  is the natural frequency of the system.

Further investigations upon this and other allied subjects appear in seven subsequent issues of the *Philosophical Magazine*. As regards the forced oscillations discussed in the *Quarterly*, the author gives, in the way of experimental verification of his mathematics, the following:—the influence of the disturbing motion becomes feebler as  $r$  increases, but it may easily be observed experimentally in a number of cases. For this purpose suspend a load by means of a spiral spring, and attach to it a pendulum light compared with the load, but of such density that the air resistance is negligible; the pendulum being of suitably chosen period, it will be found that when the load is carefully adjusted the relative equilibrium of the pendulum in the vertical motion is unstable.

I believe the beauty and interest of the results obtained by Mr. Andrew Stephenson have not been generally realised, otherwise it is nearly certain that something more satisfying in the way of experimental demonstration of these oscillations than mere observation of "instability of equilibrium" in certain cases would have been put in the field. I think an experimentalist would hardly be pleased with anything less than the actual permanent maintenance of oscillations of the type mentioned, *i.e.* something similar to the experiments of Faraday, Melde, and Lord Rayleigh for the case of double frequency, which, as Mr. Stephenson points out, is only one particular case of his general theorem.

During the course of certain acoustical work which I have been engaged in during the last two years, I observed certain types of stationary vibration which I find are undoubtedly of the kind contemplated in Mr. Stephenson's paper. These observations were made with an apparatus from which any new effects were apparently hardly to be expected. The arrangement was the well-known one of a string maintained in vibration by a tuning-fork oscillating in a direction parallel to the string. It is generally supposed that the oscillations permanently maintained have a frequency which is half that of the tuning-fork. I found this was *not* always the case. With an electrically maintained tuning-fork the amplitude of oscillation of which could be readily adjusted, the stationary oscillation of the string had a frequency of  $\frac{1}{2}$  of, equal to,  $3/2$  times, twice, &c., that of the tuning-fork, each term in the harmonic series appearing separately by itself with a fairly large amplitude, or with one or more of the others conjointly, according to circumstances. The frequency- and phase-relations could be studied by several methods, most of which were very simple applications of the principle of Lissajous's figures.

The possibility of isolating the harmonics, and also certain serious discrepancies between theory and experiment as regards the phase of the oscillations in the case of double frequency, were traced to the existence of variations of tension in free oscillations of sensible amplitude. These variations of tension were experimentally demonstrated by a special form of monochord denominated the "Ectara" (*vide* the *Journal of the Indian Mathematical Club* for October, pp. 170-5), in which the sounding surface is a membrane perpendicular to the vibrating string, and emits a tone having *twice* its frequency.

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C. V. RAMAN.

#### Absorption-bands in Colourless Liquids.

In the obituary notice of the late Dr. W. J. Russell, F.R.S. (NATURE, November 25, p. 101), whose genial friendship I enjoyed and with whom, when occasionally in London, I had friendly intercourse, it is stated that he had published "papers conjointly with Mr. Lapraik on absorption spectra, and notably one on the absorption bands in the visible spectra of colourless liquids, which was the pioneer paper in a branch of inquiry that has been ably followed up by Prof. Noel Hartley, F.R.S., Mr. E. C. C. Baly, F.R.S., and others." It seems ungracious to call in question the accuracy of this reference, and I feel, indeed, a great inclination to let it pass without comment, although it is incompatible with authoritative statements made elsewhere; but, inasmuch as the passage is liable

to be reprinted without question and repeated in other publications, I consider it would be better to invite the writer's attention to the Chemical Society's *Transactions*, xxxix., 153-68, 1881, "Researches on the Relation between the Molecular Structure of Carbon Compounds and their Absorption Spectra," and suggest that he should compare it with the paper which follows in the same volume, pp. 168-73, "On the Absorption-bands in the Visible Spectrum produced by Certain Colourless Liquids." Having done so, I think he will agree that not only is the latter not the pioneer paper, but also that there is very little in common between the two. In fact, the latter communication is more closely allied to the work of Abney and Festing in the infra-red region, a work to which the authors themselves make a special reference.

W. N. HARTLEY.

Royal College of Science, Dublin, November 30.

#### The Inheritance of Acquired Characters.

In his review of Prof. Poulton's work, "Charles Darwin and the Origin of Species," Prof. Meldola says (NATURE, November 25, p. 92) that the Darwinian theory is absolutely dependent upon the truth of the belief "in the transmissibility by inheritance of individual differences or 'fluctuations.'" This is undoubtedly true. There is now available a vast amount of evidence tending to show that "fluctuations" seemingly the direct results of changes in the environment are inherited; but how is it possible to convince Weismann and his followers that such "fluctuations" have not been due, as they will say, to "spontaneous germinal variations"? Surely the *onus probandi* really rests with them!

We have here the question of the inheritance or not of acquired characters reduced to its simplest terms. There is much and very varied evidence to show the influence of changes in the environment in producing "fluctuations" which are heritable, but what evidence can those who disbelieve in the inheritance of acquired characters present to show that in all such cases there *must* be a primary germinal change?

H. CHARLTON BASTIAN.

The Athenaeum, November 26.

#### Luminous Night Clouds and Aurora Spectrum.

On the evening of Friday, December 3, there occurred a very brilliant display of luminous night clouds in rather peculiar circumstances. During the earlier part of the evening the sky had been clear, and no indications of an aurora were observed. About 10.15 p.m. the sky became completely overcast quite suddenly, and it was noticed that this appeared to be by general formation of haze *in situ*, and not by the drifting of clouds. Almost immediately after this numerous patches of light cloud appeared, travelling with considerable velocity eastward. From numerous previous experiences it was at once apparent that these were not ordinary cloud forms, and the moon was not high enough to account for their extreme brilliancy. Careful examination with a hand spectroscope confirmed the surmise that they were luminous clouds, the green auroral line being very bright and sharply defined; on several of the brighter masses other lines were suspected, but not sufficiently well to assign any position. These observations were confirmed by Mr. W. Moss. At about 10.45 p.m. the clouds gradually became less frequent, and the sky became clear again almost as suddenly as it had been overcast.

It will be of interest to hear if any magnetic storm has been recorded for this epoch. The surface of the sun has been in continued disturbance during the past week, as evidenced by the rapidly changing forms of numerous spots. One of the largest groups would be passing round the north-west limb.

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#### Coloration of Birds' Eggs.

SOME time ago I wrote a short letter asking for information about the colours of birds' eggs, which appeared in NATURE of May 14, 1908. I read the answer to my letter in a subsequent number of NATURE, which, unfortunately, did not appear to me to throw much light on the subject.